

Application Serial No. 09/858267
Examiner: R.H. Spitzer
Art Unit: 1724

PATENT
M&G No: 12109.0044US01

Claim 6 is directed to the shape of an adsorption column. Claim 6 recites an adsorption column that is formed where the superficial velocity u [m/s] is set to be within a range of $\pm 25\%$ of $u = 0.07a + 0.095$, wherein "a" [mm] being the diameter of the adsorbent. Applicants respectfully submit that the superficial velocity determines the structure, namely the shape, of the adsorption column. For instance at page 12, lines 13-23, the shape of the adsorption column can be determined by factors including a required amount of adsorbent, a sectional area of the adsorbent column and a packing height of the adsorbent. Particularly, the superficial velocity is used for calculating such factors including the required amount of adsorbent, the sectional area of the adsorbent and the packing height of the adsorbent. In fact, the equation recited in claim 6 defines the relationship of the superficial velocity and the diameter of adsorbent particles. The equation of claim 6 determines the superficial velocity suitable for a specific diameter of adsorbent particles selected by a user. Thus, the shape of the adsorption column is provided by the relationship of the superficial velocity and the diameter of adsorbent particles, so that the power consumption can be minimized for the specific diameter of the adsorbent particles used. This principle is illustrated, for instance, in Figure 4. For at least these reasons, it is respectfully submitted that claim 6 defines features for the structure of an adsorption column, including a shape of an adsorption column.

Sircar, Rouge et al., Gmelin et al. and Hirooka et al. merely disclose specific sizes of adsorbent particles usable in the PSA process. The cited references are not directed to providing a shape of an adsorption column, and there is no disclosure in any of the cited references providing a shape of an adsorption column according to the size of particles used. As above, the present invention recites an adsorption column that is formed where the superficial velocity u [m/s] is set to be within a range of $\pm 25\%$ of $u = 0.07a + 0.095$, wherein "a" [mm] being the diameter of the adsorbent. However, the cited references do not teach or suggest the features as required by claim 6. In fact, the cited references do not disclose or suggest an adsorption column formed where the superficial velocity u [m/s] is set to be within a range of $\pm 25\%$ of $u = 0.07a + 0.095$, wherein "a" [mm] being the diameter of the adsorbent. For at least these reasons, the cited references do not anticipate claim 6 of the present invention.

Furthermore, as the cited references do not teach or suggest the features of claim 6, there is no reasonable expectation in the cited references that would lead to any advantages provided

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by the features of claim 6. The present invention provides the shape of an adsorption column where the power consumption can be minimized by the specific diameter of the adsorbent particles selected by a user (Figure 4). For at least these reasons, claim 6 is patentable over Sircar, Rouge et al., Gmelin et al. and Hirooka et al.

Additionally, claims 7-8 and 10-11 depend upon and further limit claim 6. Claim 12 is directed to a pressure swing adsorption apparatus, and includes the same subject matter of claim 6 discussed above as being patentable. Accordingly, it is respectfully submitted that these claims also are patentable over the cited references for at least the reasons discussed above with respect to claim 6.

With the above comments and remarks, Applicants believe that the claims pending in this patent application are in a condition for allowance. Favorable consideration is respectfully requested. If any further questions arise, the Examiner is invited to contact Applicants' representatives at the number listed below.

Respectfully submitted,

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